

4851

M.Sc. (CBS) Ist Semester Examination
CHEMISTRY

[Inorganic Chemistry (Theory-I)]

(DSC)

Paper-CMEM-101

Time : Three Hours]

[Max. Marks : 80

Note : Attempt *five* questions in all, selecting *one* question from each unit.

UNIT-I

1. (a) What is symmetry element? Discuss symmetry elements and operation required in specifying molecular symmetry.
(b) Deduce the symmetry and point group of following molecules :
 - (i) 1,2-dichlorobenzene.
 - (ii) Ferrocene. (8+8=16)
2. (a) Derive the complete matrices for all representations of C_{2v} group.
(b) Describe the application of group theory for bonding in tetrahedral geometry. (8+8=16)

UNIT-II

3. (a) Discuss the factors justifying the need of non-aqueous solution chemistry. What are the characteristics of ionising solvents?
- (b) What are the principle species expected in the solution of following solutes in water and anhydrous sulphuric acid :

NaOH, $(\text{NH}_4)_2 \text{SO}_4$, urea. (7+9=16)

4. (a) Discuss self ionisation, acid base neutralisation reaction, solvolytic reactions and formation of transition metal fluoride in bromine trifluoride.
- (b) HClO_4 , the strongest acid in aqueous medium acts only as weak acid in conc. sulphuric acid. Why? (14+2=16)

UNIT-III

5. (a) What is Wades rule? $\text{Os}_6 (\text{CO})_{18}$ has a monocapped TBP structure. Upon adding two electrons, the structure changes to octahedral. Explain the observation on the basis of Wade's rule.
- (b) What are boron hydrides? Describe their preparation, structure and bonding in detail. (6+10=16)
6. Explain synthesis, preparation, bonding and applications of transition metal complexes bonded to hydride anions.

(16)

UNIT-IV

7. (a) What is chelation? Discuss various factors determining the stability of chelates.
- (b) Discuss the use of thiosemicarbazones and dithiazones in chemotherapy. (8+8=16)
8. (a) Write properties of EDTA. Explain its application in chemotherapy and analytical chemistry.
- (b) Enlist common properties of organic reagents. Discuss advantages of organic reagents over inorganic reagents. (10+6=16)

UNIT-V

9. (a) What is the goal of supramolecular chemistry? Discuss some important aspects of supramolecular chemistry.
- (b) What do you understand by molecular recognition? Explain the supramolecular recognition of neutral molecules with the help of suitable examples. (6+10=16)
10. (a) Describe tetrahedral recognition of macrotricyclic cryptants.
- (b) What do you understand by molecular receptors? Discuss the principles of molecular receptor design. (8+8=16)